The Farm/Ranch Enterprise & Soil Health

Aaron Waller
NRCS Agricultural Economist
USDA
United States Department of Agriculture

NRCS Soil Health Principles

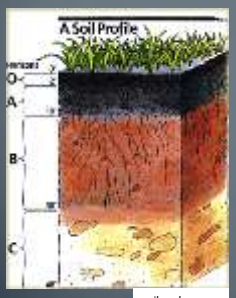
1) More soil cover
2) Less tillage
3) Biodiversity
4) Growing plants throughout the year

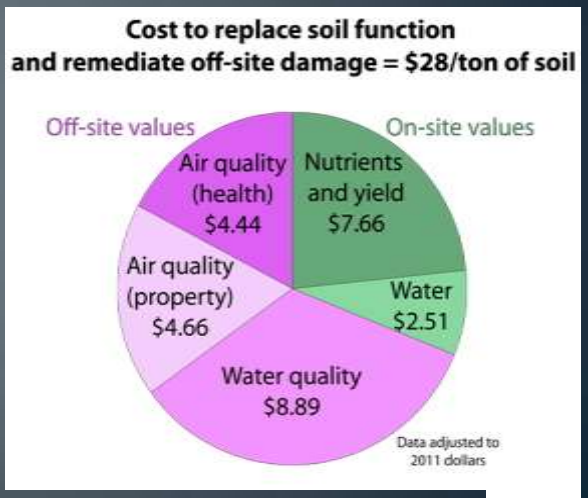
5) + Livestock !

Review of SH benefits

- Less Erosion
- Increase SOM
- Better Water infiltration
- Higher yields
- Less labor
- Fewer operations
- Reduced risk
- Reduced pathogens (weeds & insects)
- Less pesticide use
- etc……

Replacement Cost - $28/ton ?





Soil Organic Matter – $$

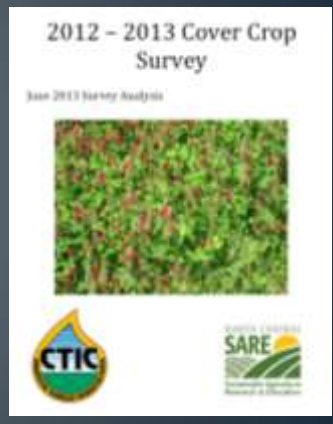
Organic Matter in an acre furrow slice

1% SOM	lbs	$/#	Value
Total	20000		
N	1000	$0.65	$650.00
P	100	$0.67	$67.00
K	100	$0.55	$55.00
S	100	$0.50	$50.00
C	10000	$0.001	$10.00
			$832.00

James Hoorman & Rafiq Islam. 2010. Understanding Soil Microbes and Nutrient Recycling. Fact Sheet SAG-16-10. Ohio State University Extension.

What Farmers are saying

- 718 completed surveys
  - 301,100 acres in Cover Crops
- Willingness to pay for CC
  - Seed ~ $30/ac
  - Planting ~ $15/ac
- Significantly higher yields (+10%) following cover crops.



http://www.northcentralsare.org/Educational-Resources/From-the-Field/2012-Cover-Crops-Survey-Analysis

Be Strategic!

Partial Budgeting

Operation	Cost ($/ac)
Harrow	$8.00
Moldboard Plow/Heavy Disk	$14.81
Shallow Disk/Vertical Tillage	$11.52
Conventional Grain Drill	$13.02
No-Till Drill	$16.05
Broadcast Dry Fertilizer (or seed)	$5.69
Boom Spray	$6.32
*Glyphosate (32oz/ac) w/surf & Catalyst	$4.51
Bale, wrap and move corn stover ($/bale)	*$22.00*
Nutrient value in a round bale of stover	*$11.00*

Niche: CC Forage after Wheat – 155 ac

- Resource Concerns
  - Wind Erosion
  - Low Fertility
  - Weed Pressure
  - Income Risk

- Cover Crop planted August 2013
  - Pea, vetch, turnip, triticale, rapeseed, mix - $28/ac
    - 3.5" rain Aug - Oct
  - No-till Drill in wheat stubble - $13/ac
  - Total investment in SH *$41/ac*

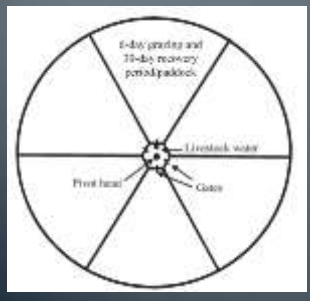
Forage after Wheat - Benefits

- 4 Grazing Periods
  - Oct 26th to Dec 15th , 2013
- 103 cows up to 141 pairs grazing
- Cow Weight * time * 3%/day = forage consumed
- 61.2 tons of forage
  - hay equivalent
  - @ $140/ton
  - $55/ac value
- ** 3 weeks spring grazing
  - Triticale regrowth
  - Additional 55 tons of forage

Intensive Grazed CC Under Pivot

Resource Concerns

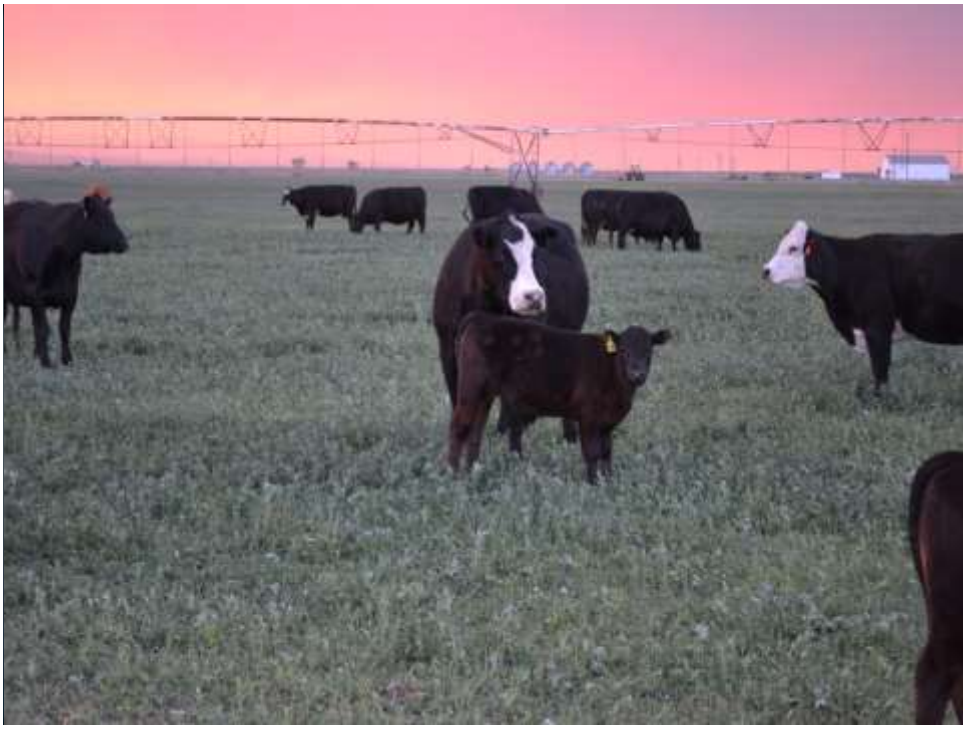
- Wind Erosion
- Soil Compaction
- Fertility



Annual Costs for 100 ac System

- Prep, Fertilizer & Planting
  - $6,227
- Seed (winter & summer)
  - Rye, Triticale, Oats, BMR Corn
  - $5,640
- Pivot & 14" Water
  - $11,884

➢ $238/ac/year
  - Variable cost to grow CC



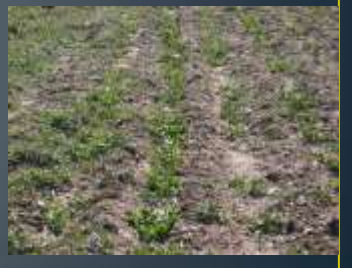
Managed Intensive Grazing - Benefits

- Reduced water usage over cash crop
- Improved organic matter content
- Soil cover for 11 months
- Managed weed pressure
- Year-round forage for 83 pairs
- Better soil structure

- 441 tons of forage grown in 2013
  - $ 60,858 gross forage value
    - ➢ Net - $371/ac/year returned to land and manager.

Austrian Winter Peas
HRW Wheat Rotation

- Organic wheat – SE Wyoming
- 70# of peas drilled into HRW stubble in early Sept
  - Krall et al. - Trials at Archer Exp. Station
- Conventional Tillage System
  - Cool Season Legume - Nutrients
  - Soil Cover during high wind period
  - Displacing weed niche
  - Easy to terminate
  - May tillage limits impacts to soil moisture.
    - Difference of 1" of water use vs. fallow



Austrian Winter Peas

2009-2013 (4 seasons)

- 45 tracts ~180 acres typical
- + 40 #N across all tracts
  - Up to 88 lbs N after one year

- Soil Health Benefits!

Production Benefits

- Less risk of low protein dockage in organic wheat
- Less risk of low yield in drought years
- Carryover nitrogen

Pea Economics

Increased Cost

- 70#/ac peas + inoculant * $0.58/lb = $40.60/ac
- No-till drill = $16.05/ac
- Spring tillage = $0 (existing practice)
- Total Cost = $56.65/ac

Increased Revenue (yield)

- 6bu/ac * $13.00/bu = $78/ac

Net Benefits = **$21.35/ac**

+ price premium on protein

+ carryover N